

What is a Watershed?

Definitions

Watershed: An area of land that is drained by a river, creek or artificial storm drain system.

Runoff: Water from rain or human sources (e.g. irrigation) that flows over a land surface.

Receiving Body: The body of water that ultimately receives the runoff from a watershed.

All of us are connected to the Pacific Ocean, whether we live in San Diego, National City, Chula Vista, Imperial Beach or one of the communities of South San Diego. We all live in a *watershed* that links us to the Ocean via San Diego Bay. Non-source point pollution, used motor oil, pesticides and fertilizers are materials introduced into the watershed that can affect the entire watershed.

Watersheds come in many sizes, from a few acres to hundreds of square miles. A large watershed is made up of many smaller ones, just as a large river is made up of many small tributaries. In urban areas, concrete channels and storm drains often replace natural streams. The San Diego Bay Watershed covers over 415 square miles, from just south of interstate 8, east to the Cuyamacas, and south nearly to the Mexican border. It is made up of small watershed.

From to south, these smaller watersheds are:

Chollas Creek Watershed, a small watershed of 26 square miles, runs through the communities of Southeast San Diego and Barrio Logan.

Paleta Creek Watershed, a small watershed, drains the 32nd Street Naval Station and empties into San Diego Bay at the 7th Street Channel.

Paradise Creek Watershed, the major drainage for National City, starts as a concrete channel and then become a natural streambed before it joins the Sweetwater River.

Sweetwater River Watershed, a large watershed covering approximately 210 square miles, has a natural streambed throughout its length.

Telegraph Canyon Creek Watershed, a narrow watershed, becomes a maze of drainage pipes in Chula Vista, emptying into the Bay around the marina.

Nestor Creek/Otay River Watershed, covering 140 square miles, is rapidly changing from rural to urban land uses.

GEOLOGY, CLIMATE, AND THE WATER CYCLE:

Topography: What makes one area of San Diego part of the San Diego Bay Watershed and another area part of the Mission Bay Watershed? Or one area of National City drain into Paradise Creek and another section into the Sweetwater River? Topography! The specific shape of the land -- the relative differences in elevation -- determines the direction in which water will flow. Water will always flow from the higher elevation to the lowest elevation. (This is normally sea level, but the Salton Sea in the desert east of San Diego is 275 feet below sea level.)

The shape of the land is the result of the interplay of San Diego's geologic history and weathering -- especially weathering caused by running water. These processes are extremely slow and continue today. It is only over "geologic time" -- from thousands to millions of years -- that changes are usually noticeable. In San Diego County, the result of these processes is seen today as a narrow coastal plain with mountains ranges and deserts to the east.

The mountains of San Diego were produced by ancient volcanic activity and more recent block faulting. Cowles Mountain, Mount Fortuna, Black Mountain and the Otay Mountains are volcanic in origin and are among the oldest landforms in the county, dating back some 140 million years to the Jurassic period. The Peninsular Ranges (Cuyamaca and Laguna Mountains) were formed as a result of block faulting about three million years ago. San Diego Bay was created by a downward block faulting of the San Diego Embayment Graben.

The coastal plains were created by the weathering of the mountains and by changes in sea level. As rain runoff flows across the land, it slowly erodes the soil and rock and carries this debris with it to the sea. The southern part of San Diego County, approximately from Interstate 8 south, has been under water under water several times. Three to six million years ago, during the Pliocene epoch, the sea extended to the foothills around La Mesa, Mount San Miguel and the Otay Mountains. During this period sediments settled in the sea forming deposits of fine sand up to 1200 feet thick. The resulting sandstone is easily eroded. About 1 million years ago, the sea level rose again, covering the low areas along San Diego Bay and extending up the river valleys. These deposits are only 8 to 20 feet deep.

As water runs down the slopes, it follows the path of least resistance -- finding cracks in rocks, small faults, the softest stone -- and eventually carving out the landscape we see today. Along the coastal plain, this erosion has dissected the mesa tops with numerous canyons which eventually lead to the Bay.

The Water Cycle—Topography and Climate: As water evaporates from the Pacific Ocean, the water vapor rises and is blown toward the mountains by the prevailing winds. When the moisture laden air mass hits the mountains, it condenses and falls as rain or sometimes snow. Very little of the moisture makes it over the mountains and this results in the desert to the east. The rain or snow that falls on the western slopes of the mountains flows downhill (either as surface or groundwater), returning to the ocean and completing the water cycle.

Man-made Changes: Human influence has greatly changed the San Diego Bay watershed. When Juan Cabrillo sailed into San Diego 450 years ago, San Diego Bay was shallow and surrounded by mudflats and marshes. The first major change took place in 1850 when the San Diego River was permanently diverted to the flood control channel. In 1888 a dam was built on the Sweetwater River and in 1919 on the Otay River. These changes resulted in a reduction of 75% of the fresh water flows, making the Bay much more saline. The Bay has been repeatedly dredged to create shipping channels and the dredged materials were used to fill in most of the mudflats and marshes. **Other resources:** Old pictures of San Diego Bay can be seen at the San Diego Museum of History.

Visualizing the Watershed: A watershed is both a "thing" (a specific area of land) and a "process" (the movement of water across this area of land). Maps can help students visualize and understand a watershed. A map showing the major rivers and streams which flow into San Diego Bay is included in this packet. A small relief map of southern San Diego County is included in your school's Stormwater Kit. **Other resources:** Large relief maps can be viewed at the San Diego Natural History Museum and outside the San Diego Unified School District Offices, 4100 Normal Street, San Diego.

Student Activities: These activities help students get a sense of the "lay of the land" and what happens to water when it lands on this land.

- 1) Mapping the San Diego Bay Watersheds
- 2) Storm Drain Walk